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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/714,193	11/17/2000	Kouichi Ichimura	199858US2SRD	5422

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ALEXANDRIA, VA 22314

EXAMINER

KAO, CHIH CHENG G

ART UNIT	PAPER NUMBER
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2882

DATE MAILED: 12/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/714,193

Applicant(s)

ICHIMURA ET AL.

Examiner

Chih-Cheng Glen Kao

Art Unit

2882

AW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 30 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 November 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 8.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Priority***

1. Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15. An English language translation is required and must be filed together with a statement that the translation of the certified copy is accurate for Japanese Patent Application 11-328333.

### ***Claim Objections***

2. Claim 16 objected to because of the following informalities, which appear to be spelling errors. In line 5, "acoustooptic" is recited. In line 7, "electrooptic" is recited. These objections may be obviated by replacing "acoustooptic" with - -acousto-optic- - and "electrooptic" with - -electro-optic- -. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

3. Claims 1-19 are rejected under 35 U.S.C. 102(a) as being anticipated by Shahriar et al. ("Solid state quantum computing using spectral holes").

4. With regards to claims 1, 14, and 19, Shahriar et al. discloses a quantum processor and method (Title, col. 1, lines 5-20) comprising physical systems in a resonator (top half of Fig. 1) having a resonator mode with a common transition frequency (Page 3, lines 4-7), each physical system having three energy levels, two transitions of three transitions between the three levels being optically allowed (physical systems in the middle of the bottom half of Fig 1), wherein a quantum bit of each physical system is expressed by either quantum states of two levels constituting a remaining optically forbidden transition or by their superposition state (Page 2, lines 9-26), and wherein at least two physical systems are included, one transition of the optically allowed two transitions being different in transition frequency for respective physical systems (bottom half of Fig. 1), and the at least two physical systems being coupled quantum-mechanically through a common resonator mode (Fig. 1 and Page 2, lines 9-26); irradiating one system with two kinds of light, a frequency difference thereof corresponding to a transition frequency of the optically forbidden transitions of the physical system, thereby setting an initial state; irradiating the other system with two kinds of light, a frequency difference thereof corresponding to a transition frequency of the optically forbidden transitions of the physical system, thereby setting an initial state; and irradiating the two systems simultaneously with two kinds of light having frequencies resonant with the optically allowed transitions other than the transitions coupled through the common resonator mode, while increasing an intensity level of one light and decreasing the intensity level of another light, thereby exchanging quantum states between the two physical systems (Page 6, Figure Caption of Figure 2).

5. With regards to claim 2, Shahriar et al. further discloses the systems held in a solid substance (Page 6, caption of Figure 1, "crystal"), and wherein one transition is different in transition frequency for respective physical systems according to a surrounding local field (bottom half of Figure 1).

6. With regards to claim 3, Shahriar et al. further discloses the systems consisting of ions (Page 3, lines 26-27) in a solid substance (top half of Figure 1), and wherein two of the three energy levels of each system are neighboring two levels (bottom half of Figure 1) generated by hyperfine structure splitting due to nuclear spin (Page 2, lines 9-26).

7. With regards to claim 4, Shahriar et al. further discloses the systems including a plurality of system groups including systems in a given range (bottom half of Figure 1), and wherein the quantum states of the systems are collectively changed (Abstract, last 3 lines).

8. With regards to claim 5, Shahriar et al. further discloses the resonator constituted by the surface of the solid substance (top half of Figure 1).

9. With regards to claim 6, Shahriar et al. further discloses energy levels set to  $|0\rangle$ ,  $|1\rangle$ , and  $|e\rangle$  (bottom half of Figure 1 and Figure 2), the method further comprising irradiating physical systems with a light frequency resonant with transitions of the systems to preprocess for information processing (Fig. 3).

10. With regards to claim 7, Shahriar et al. further discloses a scanning range set smaller than a value obtained by subtracting half of an inhomogeneous width of transitions from a central transitions frequency (Page 7, caption of Figure 4).

11. With regards to claims 8 and 15, Shahriar et al. further discloses an applied magnetic or electric field with irradiation of light, and wherein levels subjected to splitting by breaking degeneracy of the levels is used (Page 6, caption of Figure 3).

12. With regards to claim 9, Shahriar et al. further discloses a controlled-NOT operation (Page 6, caption of Figure 3).

13. With regards to claim 10, Shahriar et al. further discloses computation executed by combining operations (Page 1, last line, to Page 2, line 8).

14. With regards to claim 11, Shahriar et al. further discloses a bit operation performed by irradiating the system with two kinds of light to resonate the optically allowed two transitions (Figs. 2 and 3).

15. With regards to claim 12, Shahriar et al. further discloses a bit operation performed by irradiating the system in a solid (top half of Figure 1) to change the quantum state with two kinds of light that two-photon resonate with a remaining optically forbidden transition (Page 3, lines 3-9).

16. With regards to claims 13 and 17, Shahriar et al. further discloses the systems irradiated with light resonant with one of the transitions, not with the resonator mode, thereby reading-out the quantum states by scanning (Abstract, first 3 lines, and Figures 2 and 3).

17. With regards to claim 16, Shahriar et al. further discloses the optical system to divide light into a plurality of light paths (top half of Figure 1), and wherein each path is provided with an acousto-optic device to control a frequency of the light (Page 4, lines 24-25) and an electro-optic device to generate a pulse train (Page 4, last 6 lines).

18. With regards to claim 18, Shahriar et al. further discloses a photodetector to detect light (Page 3, lines 26-29).


### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (703) 605-5298. The examiner can normally be reached on M - F (9 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (703) 308-4858. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

  
gk

  
EDWARD J. GLICK  
SUPERVISORY PATENT EXAMINER